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FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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ROYAL CORNWALL GEOLOGICAL SOCIETY.

At the annual meeting of this society, Mr. A. Smith, M.P., the President for the year, delivered an address, in which he remarked that in the first part of the present century two sciences sprung up—Geology and Political Economy—and the filling up of the vast skeleton of the former science had been the chief objects of succeeding investigations. He found fault with our modern system of nomenclature as a complicated, superabundant, and conglomerated crowd of terms. He regretted the retirement of Mr. Joseph Carne from the office of Treasurer, considering it a sign that the thread of their communications with so valuable and estimable a man as Mr. Carne has been severed. The death of no less than four corresponding members of the society had to be recorded—Messrs. Redfield, Corrie, Richard Thomas, and Dr. Edward Moore; but it was not alone amongst their corresponding members that they had to lament many vacant places, as that occupied by Mr. Michael Williams could not fail to be noticed. His name appeared among the few remaining which constituted the list of original members. The death of Mr. Thomas Bolitho had still further reduced the slender list of their original members. It was lamented, moreover, that there were other causes, enough to raise apprehensions respecting the permanent existence of the society. It was originated in 1814 by Dr. Paris, and quickly attracted the attention of the county, and in 1818 it numbered 160 members, whilst now there remained but 60. The society may have been fortunate in numbering among its earliest supporters, and to have found in the county, such men of real note in science as at once gave it a substantial reputation; but if they cannot readily replace such names as those of Dr. Paris, Mr. Davies Gilbert, Sir Humphry Davy, Mr. Carne, Sir Charles Lemon, Mr. Robert Fox, Mr. Le Grice, Mr. W. M. Tweedy, all original members, they have, besides some of these still living amongst us, those whose attainments are enough to vindicate their scientific reputation, while there are successors to the well-known names of those who, as possessors of Cornwall's fairest estates, then so worthily offered their countenance and liberally their donations in appreciation of objects and intellectual exertions which, if they could not individually emulate, they were proud to support. Have their heirs and successors less regard for science than their fathers, or is their absence of support the result of accident and inadvertence?

The Council reported that Mr. Whitley, of Truro, had greatly added to their knowledge of Cornish geology by his communications, and a map in which the strike of the Cornish slates is shown. This map will repay a very careful study, and these quartzose beds apparently lie in the direct line of strike of the slates between the beds of which they lie. The Council would recommend that a reduced copy of this map should be published in their reports, and they expressed a hope that Mr. Whitley will continue his researches. The Council would observe that by these researches the minute detail of the geological structure of our county is being unravelled. After the several papers had been read, the election of officers for the ensuing year was proceeded with. On the motion of Mr. Davey, M.P., seconded by Mr. Pearce, Mr. A. Smith, M.P., was re-elected President. Messrs. W. Williams, of Tregulrow, J. J. Rogers, of Penrose, J. Scobell and G. Smith, of Camborne, were elected Vice-Presidents; Messrs. R. F. Bolitho, T. B. Bolitho, F. Cornish, J. Borlase, R. Davey, C. Fox, D. P. Le Grice, S. Higgs, jun., H. Paull, M.P., R. Pearce, Smyth, and N. Whitley, Council. On the motion of Messrs. Pearce and Henwood, thanks were voted to Mr. Carne for his treasurer's report; and on the motion of Messrs. Le Grice and Pearce, Mr. T. S. Bolitho was appointed Treasurer; Mr. E. H. Rodd was elected one of the Secretaries; and Mr. Couch Secretary and Curator. A discussion then took place on the appointment of a committee to enquire after an eligible site for a new building, and on the interests of the society as involved in the litigation attendant on Mr. Long's will. Messrs. Le Grice, E. Bolitho, Henwood, Pearce, and Higgs, were nominated the Committee, and after a unanimous vote of thanks to the Chairman the meeting separated.

At the dinner which afterwards took place, the usual loyal toasts having been drunk, Mr. Henwood gave a very interesting detail of the practical miners' every-day mode of procedure. The scientific, he said, might look on him with scorn, or with pity, because he knows neither the analysis, the hardness, nor the specific gravity of the stone he breaks; and although he neither calls tin ore "Cassiterite," nor grey copper ore "Redruthite," he knows one from the other, and both from yellow ore, though he is alike ignorant of its scientific name. He calls the stone, or the ore he breaks, by a name well recognised by his fellows, and though he does not discuss its characters in scientific language, he knows the promising from the unpromising, the kindly from the unkindly, the lode by its mineral ingredients, as well as the paleontologist his strata by fossils. And he shows his faith in his experience, for he risks his own and his children's bread on it. "The pitch is poor in sight," he may indeed, to blind the captain and deceive competitors, have picked out the kindly bits and distinguished the physiognomy of the whole; but he knows that the stuff he breaks, though neither tin nor ore, is akin to that which his lode produces. The metallic matter in sight may not be enough to pay him even at 10s. in 1l. (one-half tribute), but he knows that he may rely on Nature never acting by exception, that her laws are unvarying, and his reliance is that the B of his practical alphabet invariably follows its A. He "takes the pitch," therefore, at 5s. in 1l. (quarter tribute), with the firm assurance that he has read Nature aright. He had known men thus venturing earn 50%, 100%, or even more per month. True, the novice often errs; even the old tributer sometimes makes a mistake; but the neat cottages, the trim gardens, and pretty meadows, which mark the outskirts of our mining districts are infallible guides to the happy homes of our careful, cautious, and experienced miners, and show they do not trust nature and labour in vain. The objects of the founders of the Royal Cornwall Geological Society were, if he mistook not, to extend this practical knowledge, and to bring it under the dominion of science. It was to make our tutworkmen, our tributaries, our captains, and adventurers, men of observation, rather than lecturers or teachers, that the society was founded more than 40 years ago, by wise public-spirited noblemen and gentlemen, by far-seeing merchants, adventurers, and miners. Six only of these—the parents of their society—are yet amongst us; but whilst one of them yet honours us with his company, he trusted so humble a member as himself might be pardoned for asking that "The Founders of the Society" may be a standing toast amongst them.

Subjoined is the substance of the more interesting papers:—

ON THE IRON MINES OF PERRAN.

By WARINGTON SMYTH, A.M., F.R.S., &c.

At the northern extremity of Perran Strand, and adjoining the picturesque promontory of Ligger Point, a broad mass of iron ore, in close proximity to an elvan dyke, is displayed in the cliff. The great demand

for iron that has arisen since 1851 has caused the exploration of the Perran lode at several points along a course of about 2½ miles in length, with a bearing of about 28° north of west and south of east, by true meridian. This direction is contrary to that which prevails in the mining district between Perran and Helston, but analogous to that found in the St. Austell district. The dip is towards the south-west, at an angle of from 25° to 50°. The distance from wall to wall of the lode is from 25 to 70 ft., although a large proportion of this is not occupied by iron ore, a good sample of which yields 91·428 of peroxide of iron. The ore varies in colour from reddish to blackish-brown, and it is a question of high interest whether this great mass of iron ore may not be the back of a lead lode. This remarkable deposit has been opened upon in four places, and the ore shipped, but its value is seriously affected by expensive land carriage, to obviate which a new shipping place, or a railroad, would be desirable. 50,000 tons have already been exported.

NOTICE OF COPPER MINING IN CHILI.

By WILLIAM JORY HENWOOD, F.R.S., F.G.S.

The writer stated that his acquaintance with the copper deposits of Chili was limited to two districts only, in the half of which the rocks were, for the most part, composed of quartz and dark coloured mica, mixed sometimes with a little felspar, and occasionally the mica was replaced by hornblende. The copper veins he had seen were individually small ones, and in direction they coincided generally with the joints of the rock, of which there were two series, which included between them angles varying a little from about a mean of 45°. Small as the veins were, the ores they contained were so rich that they were often separately worth following; when they intersected, however, they commonly gave very large bunches. The vein-stones were for the most part quartz and gossan, but whilst traversing the hornblende formation calc-spar was not an uncommon ingredient in them; and he had seen one instance in which specular iron ore was the matrix. The ores are the green and blue carbonates of copper,—copper pyrites, the chloride, and occasionally the silicate of copper, and grey copper ore was also sometimes found. In the department of Copiapo alone an official record showed that no less than 496 new grants and 75 additions to already existing licenses to work copper mines had been made during the years 1851–1852, whilst 184 had been abandoned in the same period, and 116 were in actual work. Tonkin and Pryce seem to fix the commencement of copper mining in Cornwall at about the year 1680. Previously to 1700 the single mine of Marquesa, in Chili, had yielded 2900 tons of copper, valued at 174,000l. In 1700, two mines afforded 1800 tons of copper, valued at 109,000l.; in 1730, one mine, 108 tons, 6500l.; in 1760, three mines, 5360 tons, 322,800l.; in 1760, one mine, 166 tons, 10,000l.; in 1764, one mine, 1450 tons, 87,000l.; in 1767, one mine, 552 tons, 33,200l.; in 1790, two mines, 650 tons, 39,100l.; and in 1796, three mines afforded 3176 tons of copper, valued at 190,000l. The official document whence this extract is made brings the account down to 1843, but inasmuch as it comprises but one of the three mining departments into which the province of Alacama is divided, and that the least productive of them at present, further detail was omitted. The traffic tables of the Copiapo Railway, however, show that in the year 1856, 27,213 tons of copper ore were brought by it to the port of Caldera, besides at least 1000 tons more by other modes of conveyance. Numerous heaps of ancient slags, still containing copper enough to more than repay the cost of extraction, are from time to time found in various parts of the country; and the charcoal ashes with which they are mixed, no less than the roots of trees found plentifully in the vicinity, show that the copper was smelted with fuel cut in the neighbourhood of the mines. There are now no woods and but little vegetation in the neighbourhood whence these roots are still grubbed up as firewood. But treeless and dry as most of the Valley of Ramadilla now is, within about 25 years it still possessed flourishing woods. Although the stream which yet enters it, though larger in the hot than in the cold season, has probably long had the same average annual supply at its source amongst the snows, at Capt. Basil Hall's visit in 1821, and even as late as Mr. Darwin's in 1835, it still reached the ocean; its ancient bed is now permanently dry nearly 20 miles from the coast, thus affording another and a striking instance of the mutual dependence of moisture and vegetation on each other. The smelter fells the forest, the stream dwindles, the soil becomes parched, and culture is at an end.—Thanks were cordially passed to Mr. Henwood, and Mr. Pearce observed that the author of the paper was in the room; his only object in asking him (Mr. Pearce) to read it for him must be that the reader's name might be honourably associated with the author's in future ages.

ON THE CONSTITUTION AND STRUCTURE OF SLATE,

By Mr. W. VIVIAN, of Llandudno.

Roofing slate has lately experienced a much larger demand. In 1792 it is believed that the whole of the district of North Wales did not produce more than 20,000 tons; in 1856 this had increased to 350,000 tons, and some of it even found its way to Australia. There is no reason to think that roofing slate differs very materially from clay slates in general. The best slate shows no laminated plates or particles of mica, talc, or pyrites, neither does it on long atmospheric exposure throw out any of the crystalline effervescence of the salts of magnesia, alum, or sulphur; it resists acid and atmospheric changes, and seems allied with felspar. Its fossil character is due to the simplicity of its highly crystalline structure; its varying colour does not affect the real value of the slate; nor do its green knots or spots. Slate possesses the quality of taking and retaining colours to a very high degree, and a process is now employed on fixtures in house ornamentation, which is called "enamelling" slate; it is not, however, a true enamel, but consists of laying on the colours in imitation of marble and other designs, and fixing them by long exposure to the low heat of about 150 deg. Fahr., and then polishing off and varnishing, which gives a transparency to the colour, making it look almost as if it were real enamel. It should be remarked, however, that the colours are not absorbed into the slate, but simply retained on the irregular surface of the minutely crystalline structure. Mr. Vivian believes this process capable of very extensive application, and that it may be employed with advantage where great durability is especially desired. Nature preserves some of her most delicate and beautiful organic structures by petrifying them into stone; and it is, perhaps, worthy of consideration whether it is not desirable to employ wood less and stone more, to record in future the treasures of our archives for the benefit of posterity on thin leaves of this indestructible material, rather than on perishing paper and parchment, subject to the constant attacks of worms and the more devouring element of fire. Certain it is that had the ancient Egyptians, the Greeks, the Romans, and other nations employed slate instead of the perishing papyrus

of the Nile and such like materials, we who live in this age should have had an immense acquisition to our ancient history.

The President read a communication to the Society from himself,

ON THE CHALK FLINTS AND GREENSAND FRAGMENTS FOUND ON THE CASTLE DOWN OF TRESCO, ONE OF THE ISLANDS OF SCILLY.

What is called the Castle Down constitutes the northern extremity of the Island of Treseo, and for an extent of from 30 to 40 acres, forming the whole outer or northern portion, small chalk flints and fragmentary stones of the greensand are found scattered over the surface. It is a rough, wiry district, evidently never under culture, but said to have been in former days covered in the lower and more level parts with a peat moss, which has long since been cut away for fuel. The turf surface was also, till about 20 years back, regularly pared away every year for the same object, leaving the whole Down something like a roughly-paved street, and exhibiting about as much verdure. After 20 years' rest it is still but very imperfectly covered over with tufts of stunted heath and grass. The elevation of this Down above the sea may be reckoned as varying from about 15 ft. to near upon 100 ft. in the highest part, where these flints are found. The formation of the district, as of the whole island, is wholly granitic, and the surface on this Down, where not actual rock, is simply grown or ram, as it is locally called—that is decomposed granite, with some coating in parts of a reddish clay. It never has, and never could have been, cultivated; and some of the slopes or banks are very steep, with huge masses of rocks.

The flints and greensand stones are thinly scattered immediately upon the surface, indifferently among large or small rocks, as well as on the more level flats or steeper slopes. They vary very little in size, from about that of a hen's egg to that of a blackbird's. The flints exhibit but little action of water, but the greensand stones, being softer, are more rounded at the edges. The specimens exhibited are a fair sample of such as are generally to be found, though the largest are much above the average. Small granitic stones lie intermixed, as well as numerous bits of white quartz. The greensand seems to vary in texture as well as weight. Similar stones have been reported to have been found on some downs near the Land's End, but a recent diligent search has failed to detect the locality. I also recollect to have picked up some years back similar fragments on one of the higher parts of the Island of St. Mary's, but have been unable to recognise the exact spot. This improved vegetation does not render so easy as formerly.—Augustus Smith, Sept. 30.

Mr. Smith added that he received the information contained in this paper some time ago in Penzance from Mr. White. How flints got there he must leave to gentlemen more acquainted with geological science than he himself was to determine.

ON THE STRIKE OF THE SLATE BEDS IN CORNWALL AND DEVON.

By Mr. N. WHITLEY, of Truro.

Mr. Whitley remarks that a survey of the outcrop and strike of the various beds is the only correct foundation on which a geological map can be constructed, and from which the complicated geology of the peninsula can be unravelled, and though he had not presumed to determine what parts are Silurian, Devonian, or Carboniferous, yet it is obvious that when the geological position of a bed is determined the map will show its geographical situation and extent. The effects of the intrusion of the granite in contorting and curving the beds of slate is vividly brought out by the map, which also appears to determine the cause of the horizontal position of certain portions of the Cornish slates, and to support the theory that the granite bosses have been thrust up amidst the sedimentary rocks of the district along a line previously fractured by numerous ancient volcanic vents, the products of which may still be seen in the bands of trap and greenstone which are so common on the border of the granite. Taking a general view of the district comprised in the map, it will be seen that the older strata of hornblende and mica slate lie at the extreme south and carboniferous rocks on the north. Organic remains become scarcer, and indicate a later age in passing from north to south. It will assist, therefore, in unravelling the geology of Cornwall to consider that the oldest rocks (excluding the Exmoor group) lie on the south, and that granite abuts on beds of different ages. The map fixes the relative geological position of the strata from which so much mineral wealth has been extracted. The copper-bearing killas of Marazion, Redruth, and Gwennap is the lowest in the series, and has proved the most productive. Higher up are the less productive beds of St. Agnes and St. Austell; and still higher are the slate beds of the Caradon mining district, where copper is more abundant in the granite than in the killas. And, higher still, amidst upper Devonian slates, is the mining district of Tavistock and the rich deposits of Wheal Maria. These beds dip under the culm trough, and reappear in North Devon, in the same order of succession, and contain the same metalliferous deposits. The limestone band of Petherwin, Lifton, and Bristow again comes to the surface from Fremington to Southmolton. The copper-bearing slate of the Tavistock mines is equivalent to the Braunton, Filton, and Northmolton beds, where rich bunches of copper ore have been found. The Delabole roofing slate crops out, and is worked in the beds which run east from the Morthoe. And the lead-bearing strata of Menheniot and Beerferris reappear at the Combmartin Lead Mines.

NOTICE OF AN ISSUE OF INFLAMMABLE GAS IN THE MORRO VELHO GOLD MINE, BRAZIL.

By THOMAS TRELOAR, Associate Member of the Society.—Communicated by WILLIAM JORY HENWOOD, F.R.S., F.G.S.

The rich and extensive mines of Morro Velho, already described in the Society's *Transactions*,* is wrought in a remarkable formation of quartz and iron pyrites in clay-slate; and the ore on being stamped and amalgamated yields about half an ounce of gold per ton. In the early part of the present year, while a hole was being bored at the south, or hanging wall side, close to the junction of the lode and the enclosing rock, at 104 fms. from the surface, a pale blue flame issued from it. On removing the borer the flame rose to a height of 10 or 12 in., and continued, as it were, to ebb and flow for about a minute, and was then gradually extinguished. On applying a light to the hole, after the lapse of a few minutes, the flame reappeared, but more feebly than at first. The light being put out, the hole was blasted with gunpowder, and disclosed a bunch of quartz of about a fathom in length by six inches in width, full of vughs, and running transversely to cleavage planes of the containing rock. I had the apertures carefully plugged with clay, and a second hole bored deeper than the first, until it reached the cellular mass of quartz, and then the hole itself was in

* Mr. W. J. Henwood. Vol. vi., p. 149.

like manner closed. On making an opening of about one-eighth of an inch in diameter in the clay which filled the mouth of the hole, and applying my candle to the aperture on the following morning, ignition took place, and a flame almost like a jet of coal-gas rose some four inches high. Near the orifice its colour was pale blue, but at the top it was yellow. Once only, when the flow of gas was not plentiful, a slight explosion took place. When the aperture was large, or the flow of gas scanty, the flame was always blue; but when the orifice was small, and the gas abundant, it rose and became yellow. No odour of garlic was perceptible during the combustion, nor was any deposit left on porcelain held over it. Some bottles of the gas were handed to our medical officers for examination, but they were undecided whether it was light carburetted or arseniuretted hydrogen; and the issue ceased before a sufficient quantity could be again collected for transmission to England for analysis. Similar evolutions of gas may have taken place here before now, but if so they have passed unnoticed; nor would this probably have been observed but for the accidental ignition in course of boring. The native miners who were present at first gazed at each other in mute amazement, and then exclaimed, "We have reached the infernal regions!" I inquired why they did not escape; when they replied, "We are ready to go even there with the Englishmen."—THOMAS TRELOAR: *Morro Velho, March 31, 1858.*

MR. DAVET, M.P., read a paper by Mr. VIVIAN, of Llandudno, entitled—OBSERVATIONS ON THE GOLD FIELDS OF THE PACIFIC, AND THEIR PROBABLE EXTENT.

The actual surveys and explorations of the land in the North Pacific being yet very imperfect, it may by some be thought premature to express an opinion on the probable extent of the gold fields existing there, but having had some experience in California, as well as observations on the territories bordering on the North Pacific during the last ten years, I have formed an opinion on this subject, which I now presume to offer. The extremes of the Californian gold field are embraced within the 35th and 41st deg. of north latitude—that is, from the Kern River on the south to the northern forks of the Yuba, a branch of the Sacramento River; but the southern portion of this field has not yet yielded much gold. It is a little south of Mariposa, in about 37½ deg. of lat., that the gold diggings commenced to be very productive; thus reducing the field from which most of the returns have been made to about 240 geographical miles in length. Its breadth varies from 5 to 50 miles, although it must not be understood to run continuously—there are in some places unproductive patches of many miles in length. The gold of California has hitherto been found on the flats and valleys sloping down the Pacific side of the extensive range of mountains called the Sierra Nevada, which for a considerable distance runs north and south, nearly on the 120th deg. of west longitude. This range having taken its rise in the peninsula of Lower California, or in the northern province of Mexico, called Sonora, at the head of the Californian gulf, becomes finely developed, and throws out a spur, called the "Coast Range," which, also, is an important chain, rising from 1500 to 2000 feet in general; and one of its peaks, Mount Diablo, in the 38th deg. of latitude, attains to 3700 ft. direct from the plain: this range runs parallel to the coast, from 50 to 60 miles from the shore, through the whole of California into Oregon. No gold, however, has been found on the slopes of this range: it is the main trunk, the Nevada, whose highest peaks are no less than 10,000 feet in elevation, that gives form to its slopes so much gold. By slopes, I mean the lower range of the hills; for the flanks in the great elevation being granitic are unproductive: the debris from these upper hills is invariably found to be unproductive, there being no development of quartz veins in them. The gold-bearing rock is the micaceous and schistose rock; and although the gold is found carried down by the great rivers twenty or thirty miles below this formation into the plain, gold to any considerable amount is never found in the granitic debris above—that is, at greater elevations than the above-named micaceous rock. There is a remarkable proof of this near Sonora, in Tuolumne county, where, in the midst of a rich gold-producing district, a granitic peak, called the Bald Mountain, rises to about 4000 ft., and as high as it is flanked with the micaceous and schistose rock it bears quartz veins and gold, but no higher: many a pit has been sunk higher up on the decomposed granitic flanks, but without any success. Again, in the valleys and on the flats of the micaceous and kindred rocks there are patches of primary limestone, of the kind called *lucille*, or *stink-stone*: the cavities, and there are many in this rock, are rich in gold-bearing clay and gravel, but there are no quartz veins, and, consequently, no gold *in situ* in this rock. I have often worked on the junction of the limestone with the more favourable rock, and have always found that on touching the limestone the quartz veins die out. These limestones, however, appear to be only superficial patches lying in the basins of the more congenial rocks.

Having briefly mentioned the geographical position of the Californian gold field, with the kind of rock, and the circumstances favourable to the production of gold in that country, I may remark, in reference to the aggregate returns from there, that it is exceedingly difficult, if not impossible, to form a true estimate of the total value of the gold raised. The only data on which to form even an approximate estimate is furnished by the accounts of the annual exports of gold from San Francisco by the bi-monthly mail steamers; and this, in the ten years since the discovery of gold there, amounts to not less than \$500,000,000: to this must be added the unknown but very large amount taken to the United States, Europe, Australia, and in the hands of passengers, besides a very considerable amount coined in that country, with what still remains in the hands of the diggers there. These latter items together, after careful consideration of the information obtained by personal observation, and an extensive correspondence, I have put down at \$250,000,000, or one-half of the exports accounted for at San Francisco, making the total amount of gold extracted there in ten years worth 150,000,000/ sterling. Next arises the question, is the gold field of California nearly exhausted? I think not. Certainly its immediate returns will be greatly affected by the recent discoveries of gold in the British territories, but ultimately California will yield an immense amount of gold more. Although a large area has been dug over, it is by no means exhausted; almost every ravine and gully have their ancient river beds concealed beneath the debris and landslips that have come down the mountain sides, where new and rich leads of gold-producing dirt are found by driving tunnels; and, stretching north and south, through Tuolumne and Calaveras counties fifty miles, a tubular mass of decomposed lava, called the "Table Mountain," is found to have covered hills and valleys, where tunnelling has also met with great success; to say nothing of quartz mining, which may probably be found of value in time to come.

Proceeding then from the Californian gold field to consider the recent discoveries at Fraser's River, the question naturally arises, What is the probable extent of the new gold fields of the North Pacific? Though the information yet obtained from the British territory on the subject is exceedingly scanty, yet the opinion I have formed from carefully-considered facts is that the gold-bearing area of the North Pacific is immense. The surveys of this new country are yet imperfect, and an accurate map does not exist; but sufficient is known to prove that the Sierra Nevada range of California runs northward through Oregon and Washington territories of the United States and into British America, joining what is called the Cascade range; and it is remarkable that at Fraser's River gold has been found on the east side of this mountain chain, whereas in California the gold has been extracted from the western slopes of it. It must be stated, however, that in California the eastern side of Sierra Nevada is not explored. Col. Fremont and his band of surveyors have defined the latitude, and taken the height of the principal peaks of that range. The trapper and hunter may have gone over it, and emigrants passed through certain trails to the known easiest passes of the mountains, but, except in a very few places, the pick of the miner has never broken the surface in the search for gold. Sufficient, however, has been done to prove that gold does exist there, and in workable quantities. Carson's Valley, between the Sierra Nevada and Salt Lake, on the 39th deg. of latitude, and on the borders of Owen's Lake, on the 36th deg. of latitude, on the same side of the range also, are points that prove the existence of gold on the east side of this chain, as well as the west side, where the principal diggings hitherto exist; and when we take into account with these points the fact that gold is now found on the east side of it as high up as Fraser's River, does it not seem probable that there are gold fields existing in those comparatively unknown regions of immense extent. My opinion is that there are very extensive areas along the both sides of this mountain chain, if not also on the lower spurs and ranges which flank the Rocky Mountains even to the highest latitudes, where the schistose rock (the congenial strata) is developed, and, consequently, England and the United States possess an incalculable area of gold fields yet to be wrought. All we know yet of the gold fields at Fraser's River is that gold has been found in its bed and along its banks; but my observations in California teach me that the miners have scarcely yet entered on the gold field proper there. The real field for op-

erations is from 30 to 50 miles, or it may be 100 miles higher up, scattered along the valleys and forks, watered by the tributaries of that river, and on extensive basins or flats, scarcely watered at all. Our only information from that country tells us of the difficulty of navigating that river on account of the rapids. This is because Fraser's River frets its way along through, and parallel with, the Cascade range for a considerable distance, until it dashes through the only opening these mountains offer for it. In this respect it differs from the Columbia and Sacramento, the other large rivers that drain the interior on the North Pacific coast. These cross the same range leisurely and at right angles with it; but, I have no doubt, if the river is not navigable with safety at all seasons, the difficulty will soon be overcome by the enterprise of the miners, who will traverse and cross the mountain passes with oxen and mules, and locate on the plateaux and in the valleys, opening up a great gold field in the comparatively unknown interior. From information I have obtained, I may say that many, perhaps hundreds, of our enterprising countrymen—the Cornish miners—are already navigating the streams, and climbing the pine-clad mountains, with others, pushing their way through difficulties, to prove for themselves whether these new gold fields are a reality or not.

NOTICE OF THE COPPER MINES, AT ALDERLEY EDGE, CHESHIRE.

By SAMUEL HIGGS, Jun., Member of the Society.

The mines are situated about a mile north-east of the picturesque little town whence they derive their name; and the formation in which they are wrought is the new red sandstone. The metalliferous formation bears about south-east and north-west; and is, for the most part, nearly vertical; though in the bottom of the mine it has a slight slope towards the south-west. Although long known, the copper formation has been worked for only about three years past; and may be said to owe its examination to the skill and judgment of Mr. James Michell, a native of this county.* The portion now wrought is about 90 ft. in length, 27 to 30 ft. in width, and operations have reached to about 30 feet in depth. Traces of ore occur, however, for a further extent of more than 300 fms. south-east of the present opening. The vein-stone, if I may so term it, has—as in all other metalliferous deposits—a close resemblance to the adjoining rock; through which the ore—chiefly the green, but now and then the blue, carbonate of copper—are thinly diffused, accompanied occasionally by the earthy cobalt ore. Parallel to the copper formation on the north-east a lead lode runs so close to it that a mere shade of rock separates them. Sometimes, indeed, even this is wanting; but no material influence on either of them appears to follow their contact.† The surface in the neighbourhood of the copper mines, on the north, is everywhere covered with heaps of rubbish, the refuse of lead mines supposed to have been wrought at intervals, from the time of the Romans to within about 150 years past; on one of the lodes in this ancient work something was done as recently as the latter part of the last century, when the water was pumped out, and other mechanical operations connected with the mine were performed by aid of a windmill;‡ and I am given to understand this portion of the deposit is likely to be again examined soon. As the copper ore scarcely contains above 2½ per cent. of metal, not the least interesting circumstance connected with the mine is the treatment by which so poor an ore is wrought to advantage. The whole is crushed to a fine powder, and then treated with muriatic acid and water in equal proportions, in wooden or slate tanks, which contain each from one to two tons of ore. About 24 hours suffice for the solution of nearly all the copper contained in the stone, when the liquid is removed to other tanks, in which the copper is extracted by precipitation on scrap-iron. At present about 1000 tons of ore are obtained per month; but this will be materially increased as the works are extended. The miners receive 7d. per ton for breaking the ores, and 5d. per ton for taking it to the crusher and filling the tanks. As I believe no description of this or any similar deposit has yet been presented to the Society, this and the persuasions of one of its most constant contributors will, I hope, be a sufficient excuse for my intrusion.—Oct., 1858.

Mr. COUCH said this was the first paper contributed to the society by the writer. He believed the Burra Burra Mine was similarly situated.

Mr. PEARCE: Is the mine at Anglesea in the same strata?—Mr. HENWOOD: Yes.—Thanks were passed to Mr. Higgs.

ROUGH NOTES ON THE BANTRY BAY DISTRICT.

[FROM A CORRESPONDENT.]

If any of your numerous correspondents have ever travelled from the town of Bantry to the Sheephead promontory, I think they will agree with me that the scenery is equal, if not superior, to anything of the kind in the British Islands. The little town of Bantry is situated at the head of the noble Bay of Bantry, which is upwards of thirty miles in length, and about nine miles in breadth, and affords safe anchorage for all the fleets of Great Britain. The view from Whiddy Island, on which there are three batteries, but no guns, is really magnificent. To the east you have a full view of the Earl of Bantry's house, grounds, and deer park: on the north is Ardaghassill, and that sunny spot, Glengarriffe, with its land-locked harbour and wooded valleys; while in the back ground you have the Esk Mountains, which divide Cork from Kerry, and in the distance you see the peaks of "Macgillicuddy's Reeks." North-west, the Sugar Loaf Mountain and Hungry Hill add to the beauty of the scenery, and about due west there is an uninterrupted view of the broad expanse of Bantry Bay and the Atlantic. Looking towards the south and south-west you find the Kilorhane Mountains, White Horse Point, and Sheephead, near which the eagle builds her nest. This mountain range forms the peninsula of Meintarra, on the north side of which is Bantry Bay, and on the south side Dunmanus Bay. Having given a hasty outline of Bantry and its nobly bay, we now proceed with a description of our journey on an Irish jaunting car from Bantry to the Sheephead, a distance of about 25 very long miles; we passed along near the south shore of the bay for about six miles, when our attention was directed to a lead mine, the name of which I believe is "Kielovogue." This mine, it appears, has produced considerable quantities of lead ore, but for the want of funds to erect proper machinery to keep the mine dry it had to be abandoned. The land and minerals were recently sold under the Incumbered Estates Court, and as a clear title to the property can now be obtained, it is surprising that some capitalist has not taken it up; for, judging from the refuse from the lode at surface, we are inclined to think that it would be a legitimate speculation. The mine is well situated, and close to a safe place for shipping.

A smart walk from Kielovogue of an hour, over rocks and bogs, brings you to White Horse Point, at which place we find a valuable slate quarry and we were glad to see that preparations are being made to work it on an extensive scale. The slates are of a fine texture and good colour, and will, we were informed, withstand the severest tests. The quarry is on the south shore of the bay, and there is every facility for getting rid of the rubbish and shipping the produce. Returning to our "jaunting car," we drove on to the little village of Kilorhane, near which is a celebrated place, called the "Holy Ground." Here you can get good eggs, butter, potatoes, and whiskey; and these are things a traveller, after a mountain excursion, will relish without *sauce*; at least we found it to be so, for we made a hearty meal, and were right glad to get it. We then started again for the mountain top of Kilorhane, which is about 1200 ft. above the level of the sea, and from which you have a splendid prospect of the Kerry Mountains, far away in the north—the Dursey Head, Castletown, Berehaven, Bere Island, Sheephead, Three Castles Head, and Mount Gabriel—while apparently at your feet you have on either side the tranquil and beautiful sheets of water forming Bantry Bay and Dunmanus Bay. Tourists travel the beaten track laid down for them in the guide-book, and according to rule do Killarney and Glengarriffe in a couple of days, but they have not the least idea of the beauty and ever-changing prospects of the sea coast scenery in the South of Ireland. Our attention was next directed to some copper mines which are found at the north side of Kilorhane Mountain, and on the south shore of Bantry Bay. Ships of any tonnage can load or discharge close to the mines.

This, in a mineralogical and geological point of view, we found to be a very interesting locality. The strata consist of a light colour clay-slate, porphyritic formations, and large quantities of quartz. We found also spe-

* Author of a very interesting paper on the Lead Mines of the Sierra Almagera, in Spain, in the sixth volume of the Society's Transactions, p. 308.

† An ancient gallery has been discovered on this formation, which in two spots opens to very large dimensions. Much care seems to have been taken to smooth their sides and floors, the object of which is scarcely apparent, unless indeed they may have been prepared as places of concealment in time of danger.

‡ About 25 years since the pumps in a mine on the top of Kit Hill, near Callington, were worked by a similar contrivance.

imens of copper pyrites, iron pyrites in abundance, goossan, and pure copper ore, carbonate of copper, &c.; and in the same mineral range we found large deposits of the carbonate of manganese. Several large nodules, occur in this formation; it has, in fact, every appearance of a valuable mining district, and we were pleased to learn that some influential persons are about to work those mines on a large scale, for we believe if they are judiciously developed that large profits will be the result. We hope very shortly to resume our journey to the Sheephead, Three Castles Head, Brow Head, Crookhaven, Skull, the Audley Mines, Ballydehob, and from thence across by the "Friar's Leap" into Kerry, and as it is late in the season, we may probably take a peep into some of the Cornish deep mines.

NOTES ON MINING AND METALS.—No. II.

Iron having probably been used at first for the manufacture of various tools and utensils for domestic purposes, and subsequently for instruments of warfare, would naturally soon assert its superiority, in many respects, over other metals. It was natural that the warlike Romans should bestow considerable attention upon that branch of industry, and we find hence that they worked iron mines, and erected smelting-furnaces, in almost every one of their provinces where they met with iron ore. The principal seats of Roman iron mines and furnaces in this country appear to have been the counties of Kent and Sussex (the ore being furnished by the cretaceous iron sand), the Forest of Dean, and Wales. Since the time of the Romans the manufacture of iron in this country, though subject to periodical checks, still was probably never dormant, and must have been considerable and important during the middle ages, on account of the large demand for weapons and armour, which could not have decreased after the invention of gunpowder and the introduction of cannon.* Fire-irons of cast-iron were manufactured in England as far back as A.D. 1347. But the fuel for the iron-works had all to be furnished by the forests of the respective counties; and the consumption of timber by those works became in the course of time so alarming, that in 1584 (under Queen Elizabeth) a law was passed prohibiting the ironmasters from using any but small wood, and putting limits to the establishment of new works. Soon afterwards Edward Lord Dudley invented a process for smelting iron ore with pit coal, and obtained a patent, which was exempted from the operations of the Act 21 James I. c. 23, setting aside monopolies, but the works of the inventor were destroyed by an ignorant rabble. The invention fell into oblivion—a fate which is too often shared by many other equally important. Subsequently several attempts were made to revive that process, but it was not successfully introduced until the latter end of the last century, when about 1784 we also find the first attempts at refining cast-iron.

Cast-iron rails were first substituted for wooden ones in the year 1738 (wooden rails, lined with a thin coating of iron, having been previously employed in England and Germany—the Harts Mountains, probably, led to the discovery), but proved unsuccessful, on account of the old cumbersome wagons being used, instead of a number of small wagons linked together, a contrivance which was adopted about the year 1768. According to Mr. R. Stephenson, cast-iron rails (and iron applied to bridges) were first employed at Colebrook Dale, Shropshire; about 5 or 6 tons of rails being cast (1767) on the suggestion of Mr. Reynolds. In the year 1800, an iron railway was first constructed by Mr. Benjamin Outram, at Little Eaton, Derbyshire, stone props being employed to support the ends. Edge-rails were introduced by Mr. Jessop, at Longborough, in 1789. Cast-iron wheels as far back as 1754—two iron and two wooden ones being used for each carriage, the wooden ones to apply the *breaks*. Here I may also mention that iron chain-cables were, towards the end of the last century, employed first in ships going to the East Indies, their introduction having been suggested by Capt. Browne.

The figures in the subjoined table may help to convey an idea of the astonishing increase in the production of iron in this country:—

Year.	Furnaces.	Increase p. ct.	Annual Produce.	Increase p. ct.
1740	49	—	187,000	—
1750	61	24	204,000	9
1760	64	5	300,000	46
1770	67	5	400,000	33
1780	70	4	800,000	100
1790	95	36	1,000,000	25
1800	150	58	3,100,000	300
1810	165	10	6,100,000	100
1820	170	3	8,000,000	31
1830	315	80	14,000,000	75
1840	430	36	39,000,000	125

Glancing rapidly over the vast expanse of time that stretches itself from the earliest to the latest periods of the existence of the human race, we find that metals, and amongst them especially iron, have steadily continued to make themselves more and more indispensable to civilised man; and when, at the present moment, we can scarcely cast our eyes upon any article around us that does not partially or wholly consist of iron, or was not manufactured with the assistance of iron;—when we watch the iron-bound range of carriages thundering at an awful speed along an iron-road, traversing vast expanses of water by means of iron viaducts; or when we watch the gigantic iron-ship ploughing its way through the seas, propelled by a powerful iron steam-engine, and guided in its course by that small and mysterious iron needle;—when we see the metal bar sent up to a giddy height, commissioned to seize and fetter the very lightning itself; or when we follow the iron tubes down to the abyss of the mine, and see how they imprison and tear from their very native home the mighty waters of the deep;—when on the dictatorial stroke of an iron pen hostile armies take the field, thundering forth death and destruction from mighty iron engines of war;—then, indeed, we cannot but exclaim that iron truly rules the world!

The large quantity of tin that was exported from Great Britain had probably no small share in directing to that country the attention of the Romans; at all events, there are reasons to believe that tin mining was vigorously carried on during its occupation by those conquerors, and it has been asserted that in the tin mines of Dartmoor 80,000 people found at one time their living. The county of Cornwall was known several centuries before our era as a tin-producing county; and, in general, Great Britain appears to have enjoyed considerable reputation as a metalliferous country; for example, Cicero mentions, as a remarkable fact, that no silver was found in Great Britain,—remarkable on account of that country being so productive in metals. During the internal commotions subsequent to the Saxon conquest, the tin mines were gradually more and more neglected. But they were worked more vigorously and profitably after the Norman conquest; after which it appears that they soon fell into the hands of the Jews, by whom they were farmed, and the profits were very small till towards the end of the reign of King John. Under Edward II. the Jews were banished; and about that time the tin mines appear to have attracted a greater share of attention from high quarters, for Prince Edmund, Earl of Cornwall, caused certain statutes to be drawn up with respect to the tin mines, which may be considered as the origin of the peculiar laws and regulations of the Stannaries. Sir Walter Raleigh (whose patent dated from 1585) said, in the Debate on Monopolies, 1601:—"Now, I will tell you that before the granting of my patent, whether tin was but 17s., and so upwards to 50s. per cwt., yet the poor workman never had but 2s. a week; but since my patent they get 4s., whatever the price of tin may be." But it does not seem that the tinners' income had improved much in the course of time, for in 1693 we find them complaining, and asking for a redress of their grievances, as the cause of which they assign the high royalties, the oppression of the Cornish factors, and the dishonesty of the lawyers.

The annual produce of the tin mines during the reign of James and Charles I. amounted to about 1400 to 1600 tons; but the civil wars appear to have injured mining, the tin revenues (according to a note of Mr. Seaven, of Molineux, quoted by Dr. Pryce) being very small. In the reigns of Anne and George I. the annual returns were, on an average, above 1600 tons, so that for a space of 110 years the annual produce amounted to about 1500 tons. On the proposal of the Mines Royal Company (established 1568) to raise 140,000/ to encourage the tin trade, by farming that commodity for seven years, a committee of Cornish gentlemen reported—"That the annual quantity of tin raised was for many years back (from 1742) about 2100 tons, at 31. 5s. per cwt. for common, and 31. 9s. for grain tin, being the lowest prices, exclusive of all coinage duties." The produce from 1760 to 1780 is reckoned at about 2800 tons per annum, value 180,000/. The quantity raised having frequently been found

* The first ordnance in use were mortars; the longer cannons of a later time consisted of long iron bars, bound firmly together by thick iron rings or hoops. In 1370 the citizens of Augsburg fired from cast-iron cannons. The Swiss Maris, in the first half of the 16th century, invented the method of casting at once whole barrels, and making the bore afterwards.

to exceed the demand, and to occasion a depression in price, a result attended by the influence of war and foreign importation (from Siam and Banca, the tin mines of which latter are said to have been discovered about 1710)—it was thought advisable to provide a source of exportation for its surplus, by a contract concluded with the East India Company in 1789. The produce of the tin mines from 1780 to 1790 averaged annually about 2958 tons, value 201,400l.; and from 1790 to 1800 about 3245 tons, value 227,050l. sterling.

JULIUS.

CORNISH MINE PHOTOGRAPHS—SECOND SERIES.—No. IV. CHACEWATER VILLAGE, NEAR REDEUTH, CORNWALL.

This village appears to be a colony of miners who have worked in mines in various parts of the world. Scarcely a family is to be found one member at least of whom has not been out either to Mexico, California, Brazil, New Zealand, Australia, Africa, Spain, or some mining district of less account; in many instances their wives have accompanied them. The Portuguese and Spanish is well and very generally spoken by them when conversing on the subject of their foreign experience. It is not only amusing but highly instructive to listen to the details of their trials by field and food. From these it is to be gathered that the first who went out to Cuba to work the copper mines suffered far greater loss by death than later emigrants to that country—partly owing to the inexperience of those early miners, and partly to the carelessness of the miners themselves. Many have returned a second time, and some remained in the country for fifteen years and upwards. Nearly all secured a little competency, to enable them to get into some way of business, a public-house or beer-shop being the principal and favourite speculation. Some few have realised sufficient to maintain themselves in a state of independence. Nearly all the officers on the foreign mines are Cornishmen, and, from the representations of the miners, appear to be admirably conducted and carefully wrought. They also speak in high terms of the native Spanish descended workmen, particularly the Mexican portion, who they say are quite equal to the Cornish. Langgo, in Africa, seems to be the spot most dreaded. I met a most intelligent captain, who had been out there in quest of malachite, in which he was pre-eminently successful; shattered health obliged him to return, and no temptation on earth would induce him to go out again. Two youths who have just returned from the same station, mere wrecks of mankind, give the same doleful description; still, if men are required, no difficulty in procuring them is experienced, the wages offered being too great a temptation to be resisted. Those who have returned represent the mines as being extraordinarily rich in malachite of the hardest and finest qualities, and, with the physical difficulties of the country being overcome, inexhaustible wealth could be procured.

In close proximity to Chacewater some mines of great celebrity have been worked, including Scorrier, North Downs, Wheal Rose, Trevelyan, Hallen-league, Great Wheal Busy, Wheal Seymour, Wheal Daniel, Crooghravay, the United Mines, St. Day United, Consols, &c., returning many hundreds of thousands of pounds profit, and employing a very great population. The entire village, and much of the neighbourhood, is the property of the Earl of Falmouth. When the mines were in their prime days Chacewater was a place of considerable importance as a mining village; a capital market-house was built for the convenience of the people, but has since almost deserted. As the mines became abandoned Chacewater fell into decay and poverty. By the spirited endeavours of a few individuals the Great Wheal Busy has been set to work, where upwards of 700 people are employed—a great advantage and blessing to the locality. Although this great undertaking has not yet made profitable returns to the adventurers, its promising appearance and satisfactory progress has stimulated adventure, and many mines have been, or are about to be, put to work by powerful companies. Within a radius of four miles of the place many millions of pounds worth of copper and tin ores have been raised and sold, and what speak of the productiveness of the strata would appear a work of supererogation. Suffice it to say that it is of the slate formation in the neighbourhood of the granite, and traversed by dykes, hornblende and porphyritic dykes, as well as by metalliferous veins of all descriptions found in Cornwall.

The village, as a consequence of the resumption of the mines, is resuming its former status. Several good substantial shops have been occupied by a superior class of tradesmen; and two or three good inns are to be found, mine hosts of which do all in their power for the comfort of their guests. Other shops are being erected, but the stringent clauses of Lord Falmouth's leases (all the property is built on leases of three lives) militate against the building a superior class of houses. The places of worship are well and regularly attended, and the ministers much respected. A cricket club, and freemasons' lodge of no mean pretensions, have been established; indeed, the place presents all the elements and appearance of a thriving mining village. Long may it continue, and be emulated.

The town, too, has all the peculiarities belonging to country places. Everybody knows everybody's business better than their own, and act accordingly; this will cure itself as the population increases and business becomes more active, when they will have "other fish to fry" than talking small. Here, too, may be found the sharp, shrewd, witty, and persevering tradesman, with a joke and a kind greeting to all he comes in communication with. Here, too, is the half-witted butt; and the intelligent, kind, and respected doctor, known to all and knowing all, "breed, seed, and generation." Here, too, is the connection in business, engendered by family marriages and relationship, that almost prevents the success of any stranger endeavouring to establish a trade; this, however, will be remedied by the extension of commerce, necessarily following the exertions at present being made to prosecute the Chacewater mines.

The markets are amply and cheaply supplied, and the people well employed, contented, hospitable, and well conducted. We should like to see many villages equally prosperous and promising as the village of Chacewater, the centre of a great mining district. Though her sons may be occasionally deported to work foreign mines, they frequently return to their homes laden with wealth, improved by mixture in superior society, and the experience travel always engenders, the beneficial effects of which cannot fail being imparted to all with whom they are connected, having, as experience shows, an elevating, self-respect creating tendency, as well as a finer appreciation of the benefits by which they are surrounded, and is an inducement to thankfulness to Him by whom all these blessings have been accorded.

GEORGE HENWOOD.

"THE FIRST LOCOMOTIVE."—In the *Mining Journal* of Oct. 2 there is an article throwing light on the early history of the locomotive engine, and showing, as Mr. Smiles has done in his life of Stephenson, and as we, also, have done in the *Observer*, that Trevithick made such an engine for a railway in the year 1804 (having made, still earlier, an engine for a common road). Moreover, we have to thank the Editor of the *Mining Journal* for his courtesy in sending us a lithographed copy of Trevithick's plan. We have compared it with the plan of 1804, already referred to in our columns, from which a locomotive engine was made at Mr. John Whinfield's foundry in Pipewellgate, Gateshead, by Mr. John Steele, and find the two, with some difference in detail, to be essentially the same. Our metropolitan contemporary, when he speaks of "an attempt having been made by the North Countrymen to prove that John Steele, an employé of Mr. Whinfield, was the first inventor of a locomotive," is inadvertently in error. The fact is simply this:—Two or three old apprentices of Mr. Whinfield, who died in 1830, enabled us to correct a statement made by writers on railways, to the effect that a locomotive, made for Mr. Blackett by Trevithick in 1811, was sold to Mr. Whinfield, by whom it was used as a fixed engine. The engine so used, we proved by our informants, was made by John Steele at the spot in the year 1804. This, "Our First Locomotive," we claimed for Whinfield and Steele as their own handiwork—not for a moment ascribing to them priority over Trevithick, whose laurels are undisturbed. We cannot regret, however, that the misconception has occurred. It has had the effect of inducing Mr. Menzies, of Merthyr Tydfil, to collect evidence which must shortly have irretrievably passed away, and to place it on record in the columns of the *Gateshead Observer* and the *Mining Journal*. In doing justice to the memory of Steele, we had no thought of injustice to Trevithick. Steele and Trevithick were friends and fellow-workers. Steele was labouring with Trevithick both before and after the engine of 1804 was built in Gateshead; and the Welsh and North Country plans are, as we have already stated, alike. Trevithick's is of prior date to Steele's, but Steele was no mere copyist. The school boy of Colliery Dykes—"the extraordinary clever lad," whose master "could never set him fast"—who had "a turn for machinery" in his boyhood, and took his playfellows home "to see his initiation into the mysteries of the engine,"—"Jack Steele," who prophesied to George Bold "that the day would come when the locomotive engine would be fairly tried, and would then be found to answer"—was possessed of an original genius, and we claim for him the honour of being co-labourer with Trevithick, the constructor of the first locomotive engine. Steele, as we have learnt within the last few days from a reader of the *Mining Journal*, was employed by the British Government in raising sunken ships, and afterwards established engine-works at Rozen. He was there commissioned to make marine-engines for the Government of France. Two steam-boats he made, with oscillating cylinders, from 30 to 40 tons. A third was completed, but not handed over, when Steele received intelligence of the violent death of his brother-in-law, Nicholas Young, engineer at Fawdon Colliery (killed by an accident), and he started with the steamer on an experimental trip, intending to visit England, and bring his widowed sister and her child to his own home. His voyage, however, was brought to a fatal termination. The boat called at some French port on her way to our coast; Steele dined on shore with a friend, and on his return he was informed that something had gone wrong with the safety-valve.

Leaving his companions in the carriage which had brought them down to the water, he went on board to put the matter right, when suddenly the boiler exploded, and he and several others were killed. Such was the end of poor Steele—whose memory we would rescue from oblivion, and whose claims in connection with the locomotive engine we would establish, without injustice to Trevithick or offence to his friends. —*Gateshead Observer*, Oct. 2.

THE GOVERNMENT MINE INSPECTORS' REPORTS.

(Continued from last week's *Mining Journal*.)

In the Derbyshire, Nottinghamshire, Leicestershire, and Warwickshire (Mr. Haslam's) district, although the number of deaths in collieries has increased, the number of lives lost in the ordinary operations of mining was less in 1857 than in the preceding year. During the year reported upon upwards of 4,750,000 tons of coal were raised in the district, against 4,600,000 in 1856. Referring to the education of the mining population, Mr. Haslam remarks that the mines of this country are worked by two systems—long wall, and bord and pillar—long wall entirely in the midland coal field, and to a great extent in Scotland and the south-west of England, and is also applicable for working some of the strong seams in other coal fields; the bord and pillar system is common to the North of England, Lancashire, and parts of North and South Wales. The North of England has been proposed as a desirable locality for a Mining College for this kingdom, and if such an institution be founded in the North of England, it appears desirable that one should also be founded in the midland or long wall district, and that the students should have the opportunity of pursuing their studies at both colleges, and thus gain some knowledge of the two systems of mining.

In Mr. WYNN'S (North Staffordshire, Cheshire, and Shropshire) district there has been a slight decrease in the deaths—the number for 1857 being 67, against 70 in the preceding year. The get of coal has increased very materially during the year, and is steadily increasing, owing to the extension of the iron trade and the staple trade of North Staffordshire, the number of tons raised being upwards of 4,000,000. The anomalous state of the law with regard to ironstone mines is a serious drawback to the efficient discharge of his duties in several portions of his district, and is a ground of complaint on the part of masters and workmen; doubts in the minds of all parties continually arise whether such a pit is subject to the special rules, whether such an accident ought to be reported, and whether two pits close together, and connected at the bottom, can drawing coal, the other mines, are both subject to the provisions of the Inspection Act. There is another and more serious view of this question that must not be overlooked—that whilst accidents in coal mines are sensibly decreasing, his partial knowledge of what takes place in ironstone mines enables him to state that in those mines accidents are materially on the increase. Referring to the question of education, Mr. Wynn makes some very practical remarks, and we could wish that his suggestions were acted upon. He observes that the working man says "Bible and Gospel history can be learnt at a Sunday school, and I want my children to be learning something by which they can support himself in case anything should happen to me." And Mr. Wynn thinks that a more useful system of education should be adopted—something that shall fit the boy to become a clever man as well as a good one; that whilst he is improving his moral perceptions he should acquire some knowledge of using his mental and physical powers to advantage. The prizes should be more substantial, which would promote emulation, such as a scholarship for a year to the best boy in the school, for instance. If he chose mining, let him go to Jermy-street; if agriculture, to Cirencester; if potting, to learn chemistry; if iron smelting and rolling, to learn mineralogy and metallurgy; and so on; and then parents would have an opportunity of seeing their sons made better men than their fathers, and thus bring to light talents which would otherwise remain unexplored. Men need a day's work to know how to do the greatest amount of work with the smallest possible amount of labour, and that can best be obtained by making the clearest of our youth thinkers as well as workers. He is aware that a difference of opinion exists upon the subject, but his views are based upon an intimate acquaintance with the habits and wants of the class of persons intended to be benefited. No doubt good has arisen from the exertions which have been made, and which he hopes shortly to see greatly extended.

In the South Staffordshire and Worcestershire district, under the inspection of Mr. LIONEL BROUGH, a fraction over 11 per cent. in the number killed is all the decrease which can be exhibited, but it constitutes a saving of life fully equal in proportion to that recorded in his previous report, and though the diminution is not great, it still affords proof of the beneficial working of the Act of Parliament. In his last report Mr. Brough mentioned the getting of coal and ironstone by contract, and yet in extensive mining districts, such as Cornwall and Devon, the men are condemned to lose from one-fourth to one-tenth of their day's labour in ascending and descending by ladders, to the great and universally acknowledged detriment of their health, and shortening of life. There were only three accidents in the past year, which resulted in the destruction of not more than one life. A rather serious charge was made against Messrs. J. and C. Bailey by the Inspector, which must not be passed without notice. It appears that local juries will not find a verdict against the influential owners and managers of works. At one of Messrs. Bailey's works, the manager had clearly rendered himself responsible for the violation of rules, which had been the principal cause of the deaths of one of the men. In another district, such as Cornwall and Devon, the men are condemned to lose from one-fourth to one-tenth of their day's labour in ascending and descending by ladders, to the great and universally acknowledged detriment of their health, and shortening of life. There were only three accidents in the past year, which resulted in the destruction of not more than one life. A rather serious charge was made against Messrs. J. and C. Bailey by the Inspector, which must not be passed without notice. It appears that local juries will not find a verdict against the influential owners and managers of works. At one of Messrs. 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at intervals; and these washers being but slightly smaller in diameter than the hole itself, come in contact with the side of the hole as soon as vibration commences, and thus the vibration is immediately checked.

CORNISH MINING MAXIMS.—No. VII.

"A DOWN SOUSE" MAN DON'T CHEFFER!

We met with this old and quaint saying last week, on witnessing a bargain between a buyer of tinstone and a miner who had raised it on a tribute venture. The tinner, who well knew his business, asked a fair price for his commodity, whilst the old, shrewd tin dresser, who also knew the true value, endeavoured to purchase it as cheaply as possible. The miner refused to sell at anything less than he at first named; and, after a good deal of badinage on both sides, the miner turned round on his heel, and, uttering the exclamation at the head of our paper, with a look of the most ineffable contempt, that rendered it doubly sarcastic and significant, told the dresser he would not now sell it to him at any price; "For," said he, "had you the chance you would take me in. I like a 'down souse man'."

How few "down souse men" are to be met now-a-days, is the moral to be derived from the adage; and how great contempt are those looked upon by their fellows who are not? How much would business transactions be simplified and confidence established by adopting the principle enunciated in the homespun, antiquated maxim of our miner?

There is much room for reflection on a subject like this, and we should all do well to study it in its simplicity. "Down souse" to any but a Cornish ear sounds oddly, but the very pronunciation of the words are indicative of their meaning, many of the old Cornish words having the same peculiarity of expression,—by the sound you may judge of their real significance; this, we think, is a favourable example, and we shall from time to time make such quotations from the nearly obsolete Cornish language as will show the idiomatic nature of its construction, as in former use. They are now only to be met with in the old sayings, and even these in remote localities. Still they should not be lost; and we wonder no resident Cornishman has not thought it worth his while to redeem them from oblivion, many being rich in genuine humour, *double entendre*, and sarcasm. That forming the subject of our paper is one of sterling, downright, straightforward honesty and bluntness, such as we can easily suppose would be uttered by an unsophisticated son of labour, who perceived he was being trifled with by a practised man of the world, and who, in his conscious integrity, would exclaim—"A down souse man don't cheffer."

GEORGE HENWOOD.

* "Down souse," determined, plain-spoken. * "Cheffer," dispute, haggle.

THE UNITED STATES CLAIMING QUICKSILVER MINES WORTH FORTY MILLION DOLLARS.—A suit has been commenced by the United States of America, in the United States Circuit Court for California, to recover the New Almaden Quicksilver Mines, situated in Santa Clara county. The property is worth \$40,000,000, and the annual profits about \$1,000,000. This suit may be considered one of the most gigantic ever commenced in America, and will involve litigation for a number of years. The mines are now held, worked, and enjoyed by John Parrott, banker, New York; H. W. Hall, formerly captain in the Topographical Engineers, and now a member of an eminent law firm; James B. Bolton, W. E. Barrow, John Young, and Robert Walkinshaw. The United States claim that the grant made originally is a fraud, and the defendants are intruders, and have no right to the mines. A prayer is made in the bill for the appointment of a receiver to take charge of the land, to receive the rents and profits, and work, lease, and manage the mine; that defendants be enjoined from interfering further with the lands, and they be held to account for all the ore and quicksilver converted to their own use, and for all waste done to the land. The final disposition of this case has interest to the people of the entire country. If the United States be successful, property of the value mentioned passes into its possession, but if it ends adversely to the plaintiff, an expenditure of several hundred thousand dollars in the way of legal expenses will be the consequence. In the meantime if an injunction should issue and a receiver be appointed, \$1,000,000 annually will be paid into court.—*U.S. Mining and Railroad Register.*

THE WORKSHOPS ON THE TYNE.—Trade and manufactures, we think we may say, are reviving. On both sides of the Tyne the great workshops are becoming busier. In Gateshead, our forges are glowing with orders from the East; and in Newcastle, also, India gives bread to English artisans. It has been stated that Messrs. Stephenson and Co. are making steam engines for the Ganges; and we have also heard of a steam-carriage—a private locomotive—which they are building for the Pacha of Egypt, which will carry the Viceroy a hundred miles, with bird-like velocity, without pulling up for water.—*Gateshead Observer.*

ELEMENTARY TREATISE ON IRON METALLURGY
UP TO THE MANUFACTURE OF PUDDLED BARS:
Built upon the Atomic System of Philosophy. Elements operated upon being Estimated according to Dr. Wollaston's Hydrogen Scale of Equivalents. Comprising Suggestions relative to Important Improvements in the Manufacture of Iron and Steel, and the Conduct of extensive Ironworks.

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"It does not hesitate to say Mr. Rogers's work is the most complete combination of sound science and sound practice that has yet appeared on Iron—beyond comparison."—DAVID MCMURTER.
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Part I contains:—The President's Inaugural Address. On the Manufacture of Tin-plating, by Mr. EMBREZER ROGERS. On Blast Furnaces, by Mr. PARRY. Part II contains:—On the Action of Peaty Water containing Copper, on a Boiler, by Mr. RILEY. On the Effect of Momentum on Pumping Engines, by Mr. MICHELL. On Turret Clocks, by Mr. COPE PRANCE. On the Manufacture of Iron with Charred Coal, by Mr. THOMAS.
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Comprising a Series of New and Comprehensive Tables, practically arranged, to show at one view the Weight of Iron required to produce Boiler-Plates, Sheet-Iron, and Flat, Square, and Round Bars, as well as Hoop or Strip Iron, of any dimensions.
To which is added, a variety of Tables for the convenience of Merchants.
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Full particulars of the most important Dividend and Progressive Mines will be found in the Fourth Edition of
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OPINIONS OF THE PRESS.
Mr. Murchison's new work on British Mines is attracting a great deal of attention, and is considered a very useful publication, and calculated to considerably improve the position of home mine investments.—*Mining Journal.*
The book will be found extremely valuable.—*Observer.*
A valuable little book.—*Globe.*
A valuable guide to investors.—*Herapath.*

Mr. Murchison takes sound views upon the important subject of his book, and has placed, for a small sum, within the reach of all persons contemplating making investments in mining shares that information which should prevent rash speculation and unproductive outlay of capital in mines.—*Morning Herald.*
Of special interest to persons having capital employed, or who may be desirous of investing in mines.—*Morning Chronicle.*

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As a guide for the investment of capital in mining operations is inestimable. One of the most valuable mining publications which has come under our notice, and contains more information than any other on the subject of which it treats.—*Derby Telegraph.*
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It is full of carefully compiled and reliable information relative to all the known mine in the United Kingdom.—*Sheffield Free Press.*

Those interested in mining affairs, or who are desirous of becoming speculators, should obtain and carefully peruse the work.—*Manchester Beacon.*
Every person connected, or who thinks of connecting himself, with mining speculations should possess himself of this book.—*North Wales Chronicle.*
A very valuable book.—*Corwall Gazette.*
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Is deserving the attention of every one who seeks profitable investment of his capital.—*Brighton Examiner.*

This is really a practical work for the capitalist.—*Stockport Advertiser.*
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To capitalists the work will prove very serviceable.—*Birmingham Mercury.*
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For further particulars, apply at the company's office, No. 122, Leadenhall-street; and at Oriental-place, Southampton.

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AUSTRALIA.—MERSEY LINE.—LIVERPOOL TO
MELBOURNE, 25th of every month, forwarding passengers at through rates to Sydney, Adelaide, &c. Passage money £14 and upwards. Packet of 25th October, the magnificent new clipper ship *Black Eagle*, W. Mearns commander, A 1 at Lloyd's for seven years, 1556 tons register, 3500 tons burthen. This splendid craft, now on her first voyage, was built expressly for the Australian passenger trade; promenade deck, 300 ft. by 26 ft.; between decks, 8 ft. high, ventilated and fitted in a most superior manner; superbly furnished chief cabin, 10 ft. high.—For freight or passage apply to EDMUND THOMPSON & Co., 20, Water-street, Liverpool; or J. VINCEY and Co., 17, Gracechurch-street, and 17, Tower-hill, London.

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The following ships, sailing under the Black Ball flag, have beaten the undermentioned steamers of the Eagle line on the passage home from Melbourne:—
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PASSAGE MONEY £14 AND UPWARDS.

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EX-ROYAL MAIL PACKETS.
Appointed to SAIL from LIVERPOOL on the 5th of each Month
FOR MELBOURNE,
Forwarding Passengers by Steam to various Ports in
AUSTRALIA AND TASMANIA.

Ship.	Register.	Burthen.	Captain.	Date.
MINDOHO	1877	4000	CARP	5th November.
OCEAN CHIEF	1092	3000	BROWN	5th December.
LIGHTNING	2090	4500	BYRNE	5th January.
MARCO POLO	1628	3500	CLARKE	5th February.
DONALD MCKAY	2604	5000	TORIN	5th March.

The above line is composed of the LARGEST, the FINEST, and the FASTEST MERCHANT SHIPS in the WORLD, and have been built by the most celebrated builders of the day, including McKay, of Boston. They are commanded by men who have already rendered themselves famous, and their equipments and accommodations are unequalled by any line of ships afloat.

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PASSAGE MONEY £14 AND UPWARDS.
WHITE STAR LINE OF BRITISH AND AUSTRALIAN
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LIVERPOOL AND MELBOURNE, on the 20th and 27th of every month,
and forwarding Passengers by Steamers at through rates to
ALL PARTS OF AUSTRALIA.
To the consignment of H. T. Wilson and Co., Melbourne.
To sail.

Ship.	Captain.	Register.	Burthen.	To sail.
SHALIMAR	J. R. BROWN	1432	4500	Oct. 20.
BEN NEVIS	W. M. HERON	1347	4000	Oct. 27.
SULTANA	M. H. O'HALLORAN	1236	4500	Nov. 20.
RED JACKET	T. C. C. KERR	2360	5000	—

The *Shalimar* will be dispatched punctually at noon of the 20th October. This celebrated and magnificent clipper is the fastest sailing ship on the berth, and has made some of the most extraordinary passages on record. Her first passage was made from Liverpool to Australia (Cape Northumberland) in 67 days; from Melbourne to Liverpool in 75 days; and from Liverpool to Melbourne in 74 days; she has sailed the astonishing distance of 420 miles in one day, a feat never equalled by the fastest steamers afloat. A piano, library, and cow for the use of saloon passengers.

The well-known and favourite packet, *Ben Nevis*, the pioneer Royal Mail ship of the White Star fleet, will start on her fourth voyage in the line on the 27th October. On her last passage home from Melbourne she made the run to England in 74 days, beating every ship of the season.

Passengers must embark, without fail, on the 20th and 26th October.
For freight or passage, apply to the owners, H. T. WILSON and CHAMBERS, 21, Water-street, Liverpool.

AUSTRALIA.—WHITE STAR CLIPPERS.
The celebrated ex-royal mail clipper ship, *Shalimar*, Captain Brown, 1456 tons register, 4750 tons burthen, will be dispatched from Liverpool to Melbourne as the packet of the 20th October, sailing punctually at noon of that day. This noble vessel carries Her Majesty's Royal Mail, under contract, three successive voyages, during which she performed some of the most marvellous sailing feats on record; her first passage was made from Liverpool to Australia (Cape Northumberland) in 67 days; from Melbourne to Liverpool in 75 days, and from Liverpool to Melbourne in 75 days. She has made four voyages round the world in two years and eight months, and has sailed the extraordinary distance of 420 miles in one day, a feat never equalled by the fastest steamers afloat. Her saloons, like those of the *Red Jacket*, *White Star*, and other clippers of this line, are handsomely furnished, and supplied with piano, library, bedding, linen, and all necessaries; a cow for saloon passengers. The second cabin in the poop is an elegant and airy apartment; and the between-decks are lofty and thoroughly ventilated. Passengers must embark on the 19th without fail.—For freight or passage, apply to the owners, H. T. WILSON and CHAMBERS, 21, Water-street, Liverpool.

IMPORTANT TO THE MINING PUBLIC.
THE PATENT VALVE COMPANY, having effectually tested the working of their recently patented check valve, and having made arrangements for supplying them, are PREPARED TO RECEIVE ORDERS from the adventurers and managers of mines, and others, who may be desirous of adopting them. In introducing their valve to the notice of the mining public and others, the patentees have no hesitation in stating that the SAVING in the articles of leather and copper, and in the labour required for changing the check valve now in general use, will, under ordinary circumstances, EQUAL SIXTY-FIVE PER CENT. whilst they feel equally certain that in many cases the saving will even exceed that amount.

Full information, and terms for use of the patent right, can be obtained of Capt. JOHN DAVEY, manager of the United Mines, Gwennap, under whose inspection the valve has been for some time at work; of Capt. J. MAYNE, on the same mines; or by letter addressed to the Patent Valve Company, St. Day, Truro, Cornwall.
Dated August 25, 1858.

ZENNER'S ROTATING BUDDLE.
Nether Heath Mine, July 13, 1858.
DEAR SIR,—In reply to yours of the 7th inst., I beg to state that I consider your patent rotating buddle answers very well at this mine. It does not make the ore perfectly clean, but I attribute this more to the nature of our slimes, and the heavy, very peaty, than to any defect in the machine. By either putting the ore over the buddle a second time, or doling it, the ore is ready for market, and a few hours once a fortnight or three weeks does this. The buddle goes through the greatest quantity of slime in the least time of any machine that I am acquainted with, and I do not hesitate to say when the slimes are tolerably rich I believe it will make the ore perfectly clean by going once over it. At the same time, there is no doubt that extremely poor slimes, that will not pay cost for dressing by any other process, will leave a profit by working them with your rotating buddle.
I am, dear Sir, yours truly, WILLIAM VYFOND.

Mr. D. Zenner.
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